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CENTRAL INTELLIGENCE AGENCY

INFORMATION REPORT

REPORT [redacted]

CD NO. 25X1

COUNTRY	East Germany	DATE DISTR.	27 September 1955
SUBJECT	Heinrich Hertz Institute: Construction of a Magnetron which Operates on a 9.8 mm Wave Length	NO. OF PAGES	6
PLACE ACQUIRED	[redacted]	NO. OF ENCLS. (LISTED BELOW)	25X1
DATE OF INFO.	[redacted]	SUPPLEMENT TO REPORT NO.	

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THIS IS UNEVALUATED INFORMATION

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1. In March 1955, an open conflict came about at the Heinrich Hertz Institute (HHI) in Adlershof between the institute manager Professor Dr Otto Hachenberg and Dr h.c. Willi Praxmarer who worked on the development of magnetron tubes. On 2 March, Dr Praxmarer was suspended until further notice. He was ordered to wait at home for the investigations which were to determine whether or not he could stay with HHI. As chairman of the HHI labor union, Praxmarer had severely accused the institute manager in February. Subsequently he had resigned from this post, because of the excess amount of scientific work to be accomplished. Praxmarer was replaced by Dipl Physiker Gode (fnu), [redacted] Gode is a capable physicist, very ambitious, and works for the SED. 25X1

2. On 5 March, Professor Hachenberg ordered the dismantling of the apparatus used for Dr Praxmarer's experiments. This order, however, was cancelled by order of Dr Helmut Jung at the last moment. Dr Jung who, by order of the Ministry, was partly responsible for the magnetron construction, threatened Professor Hachenberg with immediate resignation and a report to the Ministry if the experimental apparatus was dismantled. On 8 March, the magnetron was put into operation on a wave length of 9.8 mm which was the shortest wave thusfar measured in East Germany. The magnetron remained in operation for two days and was also demonstrated to Professor Hachenberg who was very embarrassed because he had just launched a scientific attack against Praxmarer in order to ruin him. In his letter to the Academy of Sciences, Hachenberg had requested Praxmarer's suspension, among other reasons, because no results had been obtained in the latter's experiments, and because Praxmarer had only copied facts from other studies, primarily from American publications. On 10 March, Dr Praxmarer was called to demonstrate the 9.8 mm magnetron to a commission which had been composed by the academy of Professor Hans Fruehauf, Professor Rompe and Dr Georg Otterbein to investigate the Praxmarer case. After the magnetron had operated successfully, the commission retired for a conference.

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3. After the conference, Dr Praxmarer was asked to a meeting with Rompe, Fruehauf, and Otterbein who treated him very politely and admitted that the slight progress made in the 5-mm field was partly their own fault, and that with the poor equipment available, the results obtained were amazing. Rompe and Fruehauf accused HHI of inefficiency and mentioned that the entire field of high-frequency might be transferred from the institute.

4. The investigating commission came to the following conclusion: Dr Praxmarer had not reached the 5-mm wave with his experiments and had, therefore, not fulfilled the order he himself had suggested. Praxmarer, however, could not be blamed. The Academy of Sciences and the HHI management should have known that, with the technical equipment available, this project could not be carried out. Dr Praxmarer was to be fully rehabilitated. Furthermore, he was to be ordered by the Department of Physics at the Academy of Sciences to prepare plans for the mass production of 5-mm generators in East Germany. He was to work at home on this project. A department for the production of such generators was to be established. Capable personnel from all parts of East Germany were to be called, as had been done for the laboratory for plastic materials at the Institute of Organic Chemistry for which experts were called even from Chemiewerk Wolfen. Praxmarer would possibly be appointed chief of the new department or institute. The Academy of Sciences highly appreciated Praxmarer's conduct during the riots on 17 June 1953, when he was charged with the production of HHI. Living in the vicinity of the institute, it was no problem for Praxmarer to inspect it frequently.

5. On 22 March, two Soviets and one Rumanian visited HHI. Professor Hachenberg showed the institute, especially the solar installations. All visitors spoke fluent German. From the questions asked it was concluded that the visitors were experts in the fields of high frequency and solar astronomy.

6. On 21 April, Czech engineer Beckmann (fnu) from Prague lectured at HHI on VHF wave propagation over more than 100 km. The lecture was interesting and proved the excellent knowledge and capability of the guest. Beckmann's German was so good that he was suspected to be at least ethnic German, although he tried hard to appear to be a Czech.

Comment. For a copy of the research orders received by Department HHM of the Heinrich Hertz Institute where Dr Praxmarer worked, see Annex. 25X1

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1955 Research Orders Received by Department III of the Heinrich Hertz Institute

1955 Research Orders

Project F 5-14

Researcher: Dr Praxmarer, Rabe (fnu) and Foege (fnu)

Purpose:

1. Further development of magnetrons with the purpose of reaching λ 3 mm.
2. The 3-mm magnetron.
3. Development and construction of an impulse keyed magnetron which, at a 2 percent modulation (MOD) is to produce 3-mm waves. Efficiency tests.
4. Based on theoretical research, all dimensions of the tube are to be reduced geometrically and the block system with uncoupled circuits be applied.
5. Since no generators are available in Europe for the field between centimeter waves and infrared, any progress in the field of mm waves would be of great scientific importance.

Project F 5-15:

Researcher: not yet appointed

Purpose:

1. Experiments with Cerenkow type radiation for the production of mm waves.
2. Cerenkow radiation.
3. Construction of an apparatus to produce and detect Cerenkow radiation in the field of microwaves.
4. Theoretical research on continuous impulse systems. Selection of suitable delay lines for the purpose of producing the possibly required accelerating voltages of less than 100 kV. Experiments with the entire apparatus.
5. Scientific research to gain more knowledge, especially in the gap between centimeter waves and ultrared.

Project F 5-16

Researcher: Dipl Physiker Gode (fnu)

Purpose:

1. Improve thermal radiation receivers in the field of centimeter and millimeter waves.
2. Goley cells (sic) for microwaves.
3. Design a receiver for thermal radiation according to the principle of Goley cells, with optimum dimensions for the reception of microwaves.
4. Develop and construct a Goley cell with optimum structure, and find absorbers for the field of microwaves. Research on maximum sensitivity.
5. Europe has no good indicator instruments for frequencies between centimeter and infrared. The extension of the measuring range of the indicators for ultrared and microwaves fields is of importance in filling the gap between these fields.

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Project F 5-17

Researcher: Dr Mollvow (fnu) and Dr Beier (fnu)

Purpose:

1. Research on the measurement of absolute output at very low energy flow in the field of microwaves. Experiments to achieve an access to calorimetric measuring methods.
2. Output measurements at very low energy flow.
3. Eliminate differences in the indication between the various measuring methods for microwaves which occurr in spite of careful calculation of the apparatuses used. The precision is to be achieved by exact research of all possible errors and possible improvements.
4. After comparing the various methods and after theoretical and experimental analyses of all sources of error, the most reliable measuring system is to be selected and an absolute output scale is to be established.
5. An increased precision in measurement will guarantee quality.

Project F 5-18

Researcher: Dr Rabenhorst (fnu) and Dr Hartwig (fnu)

Purpose:

1. Measurement of dielectric and magnetic constants of material on semi-conductors between $\lambda = 3$ and 15 cm.
2. DK (probably dielectric constant) measurements.
3. The dielectric constants in the decimeter field can be measured down to 15 cm by means of slotted line. The frequency range of a measuring apparatus analogous to the indicator (Optik), however, starts at an upper wave length of λ ~3 cm, unless the experiments are performed with a very large sample. It is, therefore, requested that a measuring apparatus be developed and constructed which is especially suited for $\lambda = 3$ to 15 cm and to measure the DK factor of selenium and silver bromide and other semi-conductors with the given possibilities.
5. According to basic calculations it is assumed that a measurement method operating with tank circuit would be especially suited for the centimeter field. General research is, therefore, to be initiated on tank circuits and with special emphasis given to the measurement methods which operate with tank circuits. Measurements of the DK factor on semi-conductors are to be made with these newly developed methods.
5. Gain more scientific knowledge in this field.

Project F 5-19

Researcher: Farnick (fnu), Handow (fnu) and Schmidt (fnu) under the control of Dr Jung/

Purpose:

1. Research to exploit the lower fields of centimeter and millimeter waves for molecule spectroscopic and radio astronomic purposes.
2. Shortest electromagnetic waves.

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3. In order to solve essential physical and especially molecule spectroscopic and radio astronomic problems, it is of primary importance to design generators for λ - 1.25 cm and the millimeter field which can operate continuously (on dash signal) and can be frequency modulated. These generators can possibly be constructed by combining klystrons and multiple detectors. (Vervielfaeltigerdetektoren). It is intended to use these generators for molecule spectroscopy and radio astronomy.

4. Research on the properties of frequency multipliers (Frequenzvervielfaeltiger) in this field. Basic research for the construction of a mixer head for λ - 1.25 cm. Basic research for the establishment of a measuring method for λ - 1.25 cm. Characteristics of detectors in reception circuits in this field.

5. Any progress toward an experimentally controllable frequency range in the millimeter field is not only of scientific importance but also of national economic interest.

Project F 5-20

Researcher: Dr Mollwow and Dr Beier

Purpose: 1. Research on the noise (static) of gaseous discharge in the millimeter field.

2. Millimeter noise standards.

3. Experiments with gaseous discharge for its use as noise standard in the millimeter field.

4. Careful measurements of electrons and gas temperature at free gaseous discharge. Comparison of the microwave noise produced by gaseous discharge against the noise produced by a heated resistance. Research of the influence of the flow of discharge tubes on the noise output.

5. Only relative noise energy can be produced by means of heated resistances. In the millimeter field noise diodes fail because of the transit-time effect, while relatively high noise output is produced by the gaseous discharges. This is an important fact in the millimeter field, because, at the present time, the receivers are still relatively unsensitive.

Completed Research Reports on 1954 Projects

Project F 4-9a: Travelling Wave Magnetrons.

The report was prepared between 1 January and 15 December 1954. Dr Praxmarer prepared the progress report in which he tried to coordinate the studies written by Posthumus (fnu) and Hardree (fnu) on driving circuit (Leitkreis) with the anode block to be considered as a delay line (Verzoegerungsleitung).

Project F 4-9b: Construction of Magnetrons for the Millimeter Field.

The project was worked on by Praxmarer, Rabe (fnu) and Foege (fnu). It was planned to design 3-cm, 1.25-cm and 0.25 cm tubes. The construction was considered to be completed. An impulse power of several kW was achieved for 3-cm and 1.25-cm tubes. The development of the 0.25-cm tube had not started yet. The project was seriously handicapped, because all component parts even the anode paste (cement) and soft soldering had to be produced and to be done at the Institute. The stream of ions of the 3-cm tube was about 5 times as strong as the desired stream of electrons.

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Project F 4-10a: Diffraction by means of reticulated structures (Netz-strukturen) for the construction of lenses.(sic)

The 4?-page report was written by Dr **Wolfgang** Reinhardt and completed on 15 January 1955.

Project F 5-10b: Detectors.

The study was written by Flietner (fnu) and was still to be converted into a dissertation.

Project F 4-9c and 11a: Radioastronomic Measurements.
Basic research on the plasma appearing in high and maximum frequency spectrum. Research of gaseous discharge produced by UHF.

The 20-page study prepared by Dr Mollwow showed that electromagnetic waves are possible in the plasma of the electron guns (Elektronenfackel) as in metallic wires. Because of the low conductance of the plasma, a new evaluation of the basic equation for wire waves was required. A moderate damping of the waves is produced if the conductance of the plasma "K" is about 0.1 ... cm⁻¹. The values obtained in discussions of Cabine's and Wilbur's measurements were about 0.2. The electron temperatures fixed by these scientists, 100,000 degrees K (sic), did not agree with the other entropies (Zustandsgroesse) of the plasma. At 18 m c/s and a transmitting power of 5.8 kW the electron gun produced no essential differences to the figures obtained in previous measurements at 900 mc/s and 100 W. The gun is not practical for the melting of larger quantities of material.

Project F 4-11b: Paramagnetic Resonance.

Researcher: Kopp (fnu)
The project was not completed in 1954 and therefore had to be included in the 1955 projects.

Project F 4-11c: Molecule spectroscopy.

The final study, 41 pages long, was prepared by Dr Jung with the assistance of Fernick (fnu) and Hendow.

Project F 4-12: Further improvement of measurements in the millimeter field.

Dr Rabenhorst (fnu) was in charge of the project which requested dielectric constant measurements at λ ~2.5 cm according to an optical measurement system.

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